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ORIGINAL ARTICLE

Left ventricular systolic dysfunction detected by speckle tracking in hypertensive patients with preserved ejection fraction☆

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KEYWORDS
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Abstract
Introduction: The spectrum of hypertensive heart disease is wide, and can include left ventricular dysfunction. The development of echocardiographic parameters to improve patient stratification and to identify early adverse changes could be clinically useful.
Aim: To identify subclinical left ventricular dysfunction in hypertensive subjects with preserved ejection fraction (>55%), identified by global parameters of myocardial strain on speckle tracking imaging.
Methods: This was a comparative observational study of two groups of individuals: normotensive (n=20, age 59±7 years, 55% male) and hypertensive (n=229, age 62±12 years, 57% male). Left ventricular function was assessed by various conventional clinical and echocardiographic parameters and global longitudinal and circumferential myocardial strain. Cut-off values to detect subclinical left ventricular dysfunction were established and applied in the hypertensive group. The Student's t test, Mann-Whitney test and chi-square test were used for the comparative statistical analysis.
Results: Most hypertensive subjects (53.7%) had grade I hypertension; blood pressure was controlled in 64.9%, and 54.8% showed left ventricular structural changes. Comparison between the normotensive and hypertensive groups showed no significant differences in parameters of global longitudinal or circumferential systolic strain. Application of the cut-offs to the hypertensive group identified 35 individuals (15.3%) as having subclinical left ventricular systolic dysfunction as assessed by global longitudinal myocardial strain parameters.

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Conclusions: In this group of hypertensive patients, global myocardial strain parameters identified a group of individuals with subclinical left ventricular systolic dysfunction despite preserved ejection fraction. The clinical relevance of these findings needs to be assessed in long-term follow-up studies.

PALAVRAS-CHAVE
Hipertensão arterial;
Deformação miocárdica;
Disfunção ventricular esquerda subclínica;
Ecocardiografia;
Speckle tracking

Disfunção sistólica ventricular esquerda detetada por *speckle tracking* em hipertensos com fração de ejeção preservada

Resumo
Introdução: O espectro da cardiopatia hipertensiva é diverso podendo ir até à disfunção ventricular esquerda. O desenvolvimento de metodologias ecocardiográficas que permitam melhorar o estadiamento da cardiopatia hipertensiva e identificar precocemente hipertensos em risco de evolução desfavorável poderá ser clinicamente relevante.
Objetivos: Identificar o compromisso subclínico da função ventricular esquerda em indivíduos hipertensos com fração de ejeção preservada (> 55%), utilizando parâmetros globais da deformação miocárdica *(Speckle Tracking)*.
Metodologia: Foram estudados dois grupos de indivíduos: normotensos (N = 20; 59 ± 7 anos; 55% homens) e hipertensos (N = 229; 62 ± 12 anos; 57% homens), tendo sido avaliados vários parâmetros clínicos e ecocardiográficos de função ventricular esquerda (convencionais e parâmetros globais da deformação miocárdica longitudinal e circunferencial). Foram determinados os *cut-offs* da normalidade a partir do grupo de normotensos e aplicados ao grupo de hipertensos, para se detetar disfunção ventricular esquerda subclínica. Foram utilizados os testes *t* de *Student*, *Mann-Whitney* e do *Qui-Quadrado*.
Resultados: O grupo de hipertensos apresentou na sua maioria hipertensão arterial do tipo I (53,7%), pressão arterial controlada (64,9%) e alteração estrutural do ventrículo esquerdo em 54,8% dos indivíduos. Não se detetaram diferenças significativas entre os grupos nos parâmetros globais de deformação longitudinal ou circunferencial. Após aplicação dos *cut-offs* da normalidade nos hipertensos, foram identificados 35 indivíduos (15,3%) com disfunção ventricular esquerda subclínica.
Conclusões: A avaliação da deformação miocárdica permitiu identificar o compromisso sistólico subclínico da função ventricular esquerda num grupo de hipertensos com fração de ejeção preservada. A relevância clínica destes achados deverá ser confirmada por estudos de *follow up* prolongado.

List of abbreviations

GCS	global circumferential systolic strain
GCSR-a	global circumferential late diastolic strain rate
GCSR-e	global circumferential early diastolic strain rate
GCSR-s	global circumferential systolic strain rate
GLS	global longitudinal strain
GLSR-a	global longitudinal late diastolic strain rate
GLSR-e	global longitudinal early diastolic strain rate
GLSR-s	global longitudinal systolic strain rate
HTN	hypertension
LV	left ventricular
OR	odds ratio

Introduction

Hypertension (HTN) is the leading risk factor for cardiovascular disease, and the third most important cause of morbidity, making early diagnosis and risk stratification crucial.[1,2] Echocardiography is essential for assessment of the cardiac repercussions of HTN, particularly for early detection of left ventricular (LV) dysfunction, which is common in hypertensives.[3]

Conventional echocardiographic evaluation of hypertensive patients focuses on three key aspects: (1) degree of hypertrophy; (2) severity of diastolic dysfunction; and (3) global systolic function. This approach is closely linked to the idea that there is a continuum of cardiac expression in HTN and that LV systolic dysfunction develops late in its natural history.[3–5] Advances in echocardiography over the last ten years have provided new methods of analysis that challenge this model, particularly analysis of myocardial strain by speckle tracking, which enables quantitative assessment of LV function with a high level of diagnostic accuracy.[6,7]